TRAMEX®

CMEXPERT

Non-Destructive Concrete
Moisture Meter

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Humidity Meter

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Wood Moisture Probe

User Guide

CMEX 0306

TRAMEX MOISTURE/HUMIDITY INSTRUMENTS

SURVEY ENCOUNTER: The intelligent moisture meter.
"State of the art" non-destructive moisture meter for measurement and data logging of moisture in building materials.

MOISTURE ENCOUNTER PLUS
General purpose non-destructive moisture meter employing advanced analog and digital technology.

CONCRETE ENCOUNTER CME 4
Non-destructive moisture meter for concrete floors.

CRH FLOORING KIT
Complete kit for non-destructive testing of concrete floors and relative humidity testing of flooring by either the in situ probe method (*to ASTM F 2170-02)* or the RH hood method (ASTM F 2420-05 *and BS 5325:2001 & 8203:2001*). Also has data storage for 900 readings.

RHR FLOORING HYGROMETER KIT
Complete kit for relative humidity testing of flooring by either the in-situ probe method (*to ASTM F 2170-02)* or the RH hood method (ASTM F 2420-05 *and BS 5325:2001 & 8203:2001*).

FLOOR INSPECTION KIT
Complete kit for moisture testing concrete, hardwood flooring, sub-flooring and environmental monitoring.

MRH
Digital Moisture and Humidity Meter with 4 scales for wood, roofing, masonry and drywall. Humidity probe also available. Also suitable for humidity testing of flooring by either the in situ probe method (*to ASTM F 2170-02)* or the RH hood method (ASTM F 2420-05 *and BS 5325:2001 & 8203:2001*).

PROFESSIONAL MOISTURE METER
Digital resistance meter with probes, tests deep into wood.

COMPACT MOISTURE METER
Economical pin-type resistance meter for wood.

SKIPPER PLUS
Checks wooden boats for decay and finds osmosis in GRP.

LEAK SEEKER
Leak tracing in flat and built-up roofing.

DEC SCANNER
Mobile non-destructive surveying of flat roofs.

WET WALL DETECTOR
Non-destructive moisture evaluation and tracing in EIFS.

RWS ROOF AND WALL SCANNER.
For moisture scanning and leak tracing on roofing, EIFS and the building envelope.

MOISTURE & HUMIDITY INSPECTION KITS ARE AVAILABLE FOR THE FOLLOWING INDUSTRIES:
Floor inspection / EIFS wall inspection / Roof inspection / Indoor Air Quality / Water damage restoration.

User Guide

Table of Contents

Introduction

Congratulations on your selection of a new **CMEXpert** instrument from Tramex with three measurement modes.

The **CMEXpert** utilises "state of the art" electronic technology to provide you with an accurate and easy to use non-invasive instrument for **non-destructive testing (NDT) of Moisture Content (MC) in concrete and comparative readings in gypsum and other floor screeds.**

The **CMEXpert** has 2 other modes of operation:

1). By inserting the optional plug-in RH probe, the instrument automatically changes to hygrometer mode. **This enables the CMEXpert to measure relative humidity (RH), temperature, dew-point temperature and mixing ratio of the environment or in a structural material.** A structural material such as a concrete slab can be tested using the in-situ (ASTM F2170-02) or RH Hood (ASTM F2420-05) methods and British standards BS 5325:2001 and BS 8203:2001.

2). By inserting the optional plug-in pin probe for wood, the instrument automatically changes to wood pin-meter mode. **This enables the CMEXpert to measure the percentage moisture content (% m.c.) of wood and wood-based products.**

How it works

In **concrete moisture measurement mode**, the instrument operates on the principle that the electrical impedance of a material varies with its moisture content. The electrical impedance is measured by creating a low frequency alternating electric field between the electrodes as illustrated in Figure 1opposite.

This field penetrates the material under test. The very small alternating current flowing through the field is inversely proportional to the impedance of the material. The instrument detects this current, determines its amplitude and thus derives the moisture value.

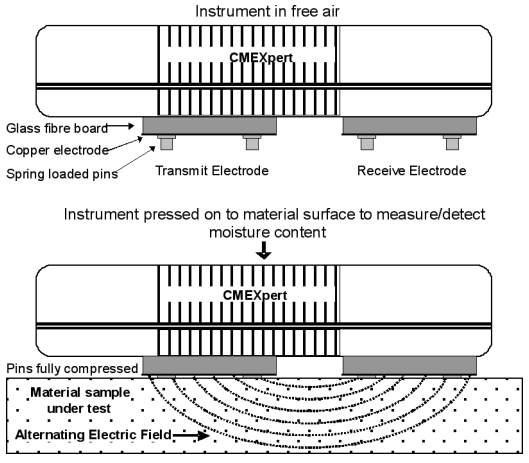

Figure 1.

In **Hygrometer** mode, the CMEXpert determines the capacitance of the RH probe sensor which varies with the relative humidity of the testing environment. The CMEXpert displays this capacitance as percentage relative humidity (%RH). It also measures temperature and displays dew-point temperature and mixing ratio.

In **Pin Meter** mode the CMEXpert is a resistance type pin meter for determining the moisture content of wood and wood-based products.

Instrument Features

Your **CMEXpert** employs advanced digital technology to enable the incorporation of many features that are listed below.

- 3 modes of measurement: Non-destructive moisture measurement, hygrometer and wood pin probe.
- Three simple membrane keypad controls: **ON/OFF, SCALE** and **HOLD.** The red button at the end of the instrument is used in **Hygrometer Mode** for changing from ºC to ºF and vice-versa.
- 4 Optimised Scales: Concrete, CM Equivalent, Gypsum and Reference Scale. These are selected using the **SCALE** button.
- Moisture readings and scale are displayed on a clear easy to read liquid crystal display (LCD).
- The Reference Scale is displayed both numerically (0-99) and in a bar graph form on the bottom line of the display.
- Relative Humidity (RH) readings, probe temperature, dew-point and mixing ratio are automatically displayed when the RH Probe is inserted **(Hygrometer Mode).**
- In Pin meter mode wood moisture contents from 7 to 40% are displayed.
- To conserve battery life, the instrument automatically powers OFF after 10 minutes of inactivity or when the **ON/OFF** button is pressed.
- Power remains 'ON' if a change in meter reading is detected or any button is pressed.
- An audio alert (bleep) will sound 10 seconds prior to the meter automatically powering OFF.
- When the battery requires replacement a LOW BATTERY message is shown on the LCD.
- **HOLD** button freezes reading to facilitate ease of recording readings. When the **CMEXpert** is in HOLD mode, 'H' will flash on the display.
- If HOLD was selected prior to the **CMEXpert** automatically powering off, the frozen display reading is digitally memorized and restored next time ON is selected.

OPERATING INSTRUCTIONS

A diagram of the instrument face with brief notes on the push button controls and LCD is shown on page 7 (Figure 2).

Non-Destructive Measurement Mode

1. Press the **ON/OFF** button to power up. With no RH probe or pin probe connected the last used scale will be displayed on the LCD. Press **ON/OFF** button again to power down.
2. To change scale, press/release the **SCALE** button until the required scale is displayed.
3. Press your **CMEXpert** directly onto the surface of the material being tested ensuring that all of the electrode spring-loaded pins are fully compressed.
4. For the Reference scale the readings are comparative from 0 to 99. A visual indication is also given by the bar display on the bottom line of the LCD.
5. The readings on the reference scale are not to be interpreted as a measurement of percentage moisture content (% MC) or relative humidity (RH). It is not a relative humidity reading and it does not have any linear correlation with Relative Humidity measurements. This scale should be regarded as a reference or qualitative scale only.

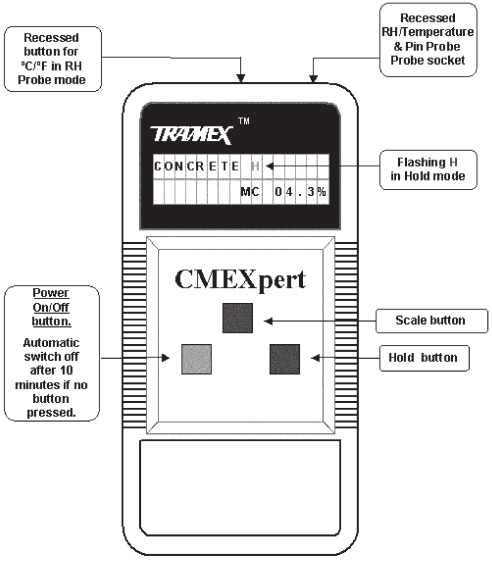

Figure 2

6. When the Concrete, Gypsum or CM Equivalent scale is selected the moisture content (MC) is shown on the right-hand side of the bottom line of the display. The readings on the Gypsum and CM Equivalent scales are qualitative only.
7. The **CMEXpert** will automatically power-off after ten minutes if no button is pressed or if no change in meter reading is detected. If a button is pressed or the meter reading changes, the power-off will be extended for an additional ten minutes.
8. To freeze readings press the **HOLD** button once. While on HOLD, **H** will flash slowly on the upper line of the display. If the unit powers OFF while on HOLD, the frozen meter reading is digitally memorized and restored next time ON is selected. To remove freeze, press **HOLD** button again.

Humidity Measurement Mode

Hygrometer (Humidity) mode is activated by plugging the optional Relative Humidity (RH) Probe into the socket at the top of the instrument. The display shows relative humidity (RH), temperature (T), dew-point temperature (Td) and mixing ratio in grains/lb (GRN) or g/kg (gms). When the RH Probe is plugged in the red button at the top end of your **CMEXpert** is used for changing the temperature between ºC and ºF and the mixing ratio between g/kg and grains/lb.

Wood Pin Meter Mode

This mode is activated by plugging the optional Wood Pin Probe into the socket at the top of the instrument. In pin meter mode the **CMEXpert** works on the principle of electrical resistance. When the electrode pins are pressed or driven into the wood, the electrical resistance between the electrodes is measured and indicated on the digital display. If the wood is dry, the resistance is very high. The higher the moisture content, the lower the resistance. This resistance is accurately measured by the instrument, which translates it into a percentage moisture content for wood. The **CMEXpert** gives moisture readings from 7% to 40%. It should be noted that readings above 27% (nominal value of the fibre saturation point) are indicative only.

Typical CMEXpert Displays

Moisture Measurement Mode

C	O	N	C	R	E	T	E							
								M	C		0	4	.	3	%

C	M		E	q	u	i	v	.						
								M	C		0	2	.	8	

G	Y	P	S	U	M									
								M	C		0	2	.	3	

R	E	F											4	5

Battery Warning

		L	o	w		B	a	t	t	e	r	y		

Humidity Probe Display

METRIC

Relative Humidity **Flashing ‘H’ in Hold mode** **T ºC**

R	H		5	0	.	1	%		H		T		2	0	C
T	d		1	1	.	7	C		0	0	0	7	g	m	s

Dewpoint (Td) ºC **Mixing Ratio g/kg**

IMPERIAL

R	H		5	0	.	1	%		H		T		6	8	F
T	d		5	3	.	1	F		0	0	5	1	G	R	N

Wood Pin Probe Display

P	I	N		P	R	O	B	E							
								M	C	=	1	0	.	8	%

Moisture Content

WORKING WITH YOUR CMEXpert

Non-Destructive Measurement Mode

Concrete Scale

For concrete, read the moisture content from the top, 0 to 6.9%, scale of the CMEXpert display. Readings on a concrete floor slab obtained on this scale indicate moisture content measurement and should not be confused with lbs emission or any other unit of measurement obtained by other moisture testing methods or meters. It should also be noted that there seems to be no linear correlation between moisture content measurements and lbs emission measurements as obtained using calcium chloride testing methods.

CM Equivalent Scale

Your **CMEXpert** gives readings of 0 to 5 on the CM Equivalent Scale. These are approximated equivalent readings to the carbide test method for concrete.

Gypsum Scale

The **CMEXpert** gives moisture content readings from 0 to 12 (comparative) on Gypsum and Anhydrite screeds.

Reference Scale

The reference scale (0 to 99) can be used for comparative readings. This scale is not to be interpreted as a measurement

of percentage moisture content, or relative humidity. It is not a relative humidity reading and it does not have any linear correlation with Relative Humidity measurements. This scale should be regarded as a comparative or qualitative scale only. This reference scale is included to facilitate comparative testing of different areas where direct contact with the bare concrete surfaces may not be possible due to some form of very thin coating or covering on the concrete, or additive in the concrete that could influence the readings. This scale is not suitable for reading through thicker floor coverings such as wood laminates etc. Readings from the reference scale are comparative only and of help in identifying areas with moisture problems.

Drying time for concrete floors and screeds

Concrete floors and screeds must be allowed to dry to an adequate level before the installation of sheet material, tile, wood or coating. Manufacturers of such systems generally require moisture testing to be performed before installation on a floor slab. Moisture content measurement is one such method. Excessive moisture in or permeating from a floor slab after the installation of a floor covering or coating can cause failures such as condensation, blistering, delaminating, movement and general deterioration of the finished flooring/coating. There is also a risk of promoting microbial growth.

No exact period can be specified for the drying of such floors to reach an acceptable moisture content, as this is affected by temperature and humidity within the building as well as concrete curing times and other factors. Typically a period of 1 month per inch (25mm) depth of concrete or sand/cement screed is often quoted. Longer periods may be required in areas of high humidity or low temperature. During the drying period and prior to applying the floor covering, the floor should be regularly checked to monitor moisture content.

Testing for moisture content in a floor slab

Pre-test conditioning and preparation

For best and most accurate results, tests should be carried out after the internal conditions of the building in which the slab is located have been at normal service temperature and humidity for at least 48 hours.

All artificial heating or drying equipment should be turned off at least 96 hours before final readings are attempted, otherwise results may not accurately reflect the amount of moisture present or moisture movement in the slab during normal operating conditions.

Prior to testing, the actual test area should be clean and free of any foreign substances.

Where covered floor slabs are being tested, all covering materials, adhesive residue, curing compound, sealers, paints etc., shall be removed to expose a test area of clean bare concrete. For removal of any existing flooring or adhesives, strictly observe all the appropriate safety and health practices relevant to cleaning and removal of these types of materials. Removal of covering materials and cleaning if required shall take place a minimum of 48 hours prior to testing.

Use of water based cleaning methods that could lead to elevated surface and/or sub-surface moisture levels in the floor slab are not recommended, and testing after such treatment could result in elevated readings.

No visible water in liquid form should be present on the concrete at the time of testing with the **CMEXpert**.

Avoid testing in locations subject to direct sunlight or sources of heat.

Use of artificial aids for accelerated drying of concrete is not recommended. If they are being used it is recommended they should be turned off at least four days before taking final readings.

Testing procedures

1. Remove any dust or foreign matter from the **CMEXpert** electrodes before commencing tests.
   Make sure that the floor slab being tested is clean and bare and free from dust, dirt or standing water.
2. Push the ON button and press the instrument directly onto the surface of the material being tested ensuring that all of the electrode spring loaded pins are fully compressed. Read the moisture measurement from the appropriate scale of the moving coil meter dial.
3. On a rough surface, take a number of readings in close proximity to one another. **If the readings vary, always use the one with the highest value.**

Humidity Measurement Mode

The RH Probe utilises "state of the art" electronic technology to provide an "easy to use" and accurate method for measuring relative humidity, mixing ratio, temperature and dew point in a wide range of applications such as:-

- Heating, ventilation and air conditioning (HVAC) systems.
- Environmental and building monitoring.
- Building inspection.
- Flooring (including ASTM F 2170-02 In Situ & ASTM F 2420-05 RH Hood methods). BS 5325:2001 and BS 8203:2001.

A typical **CMEXpert** display with the RH Probe attached is shown on page 10. Pressing the red button at the end of the instrument changes the temperature readings from ºC to ºF, the mixing ratio from g/kg (gms) to Grains/Lb (GRN) or vice-versa.

NOTE: **When performing Humidity tests on Concrete Flooring it should be noted that:**

A): Use of artificial aids for accelerated drying of concrete is not recommended. If they are being used it is recommended that they be turned off at least four days before taking final readings.

B): It is important that the installer ensures that the floor covering is applied at the moisture content and or relative humidity specified by the manufacturer of the floor coverings and/or adhesives.

C): It is very important that RH probes are handled with care and protected from harsh environments in order to maintain their long-term stability. It is recommended that you do not insert the RH probe into concrete until the chemical reaction between the cement and water has taken place and the drying process has begun. To achieve this it is recommended that you do not insert the probe into the hole in the concrete until the moisture content of the concrete has dropped below 5% when measured with a **Tramex CMEXpert, CME4** or **CRH**. RH probes should not be left enclosed in concrete or similar environments at an RH level greater than 93% for long periods, in these situations it is recommended to remove the RH probe and allow the test area to continue to acclimatize by replacing the stopper in the hole liner sleeve.

Calibration checking of RH Probe

Each RH probe is factory calibrated using precision equipment traceable to NIST standards. With reasonable care in use and storage, RH probe measurements should remain within the ±3% specification. RH probe accuracy can be degraded by exposure to polluted atmospheres such as dust, aggressive chemical vapors, or contaminated wetting. It is thus advisable to periodically check the RH Probe accuracy by using RH 75 or a similar suitable reference kit. These kits contain a saturated Sodium Chloride salt solution, which creates a nominal 75% relative humidity within the measuring cell. The precise relative humidity is temperature dependent. The RH 75 calibration check is available from the manufacturer or the supplier of your **CMEXpert** meter.

Wood Pin Meter Mode

Factors Affecting Moisture Readings

The readings of all moisture meters are influenced by the characteristics of different species of wood as well as temperature and other factors listed below.

Species

Different species of wood can vary in density and conductivity, which can have an effect on the electrical resistance of the wood. This can influence meter readings for the same moisture content and can also apply to similar species from different origins. A species adjustment table is provided on page 20 to 31.

Temperature

Meter readings can be affected by wood temperature. The Wood Probe is calibrated at 20ºC (68ºF). At wood temperatures above 20ºC (68ºF), the meter readings are higher and at wood temperatures below 20ºC (68ºF) the meter readings are lower. A temperature adjustment chart is provided on page 19.

Chemical treatment or contamination

Readings may be affected by certain flame retardants, preservatives, aluminium paint and by contamination by salt water. Treat all readings on such wood as indicative readings only.

Surface Moisture

Surface moisture due to wetting or condensation can affect readings when uninsulated pins are used. It is recommended that insulated pins such as SP-52 are used in conjunction with HA-22 Hammer Action electrode. As the pins are driven into the wood, readings can be taken at different depths unaffected by moisture on the surface.

Wood Flooring

a) Excess moisture in wood flooring or concrete sub-floors can cause major problems.
b) For instance, if installed with excess moisture, the wood can subsequently shrink leading to job failure.
c) If a wood floor (solid, laminated or engineered) is installed above wet concrete the wood can absorb moisture emitting from the concrete causing the wood to swell and buckle and even cause structural damage to the building.
d) When vinyl or other impervious coverings are applied over wet concrete, the result can be failure of the adhesive and blistering of the surface.
e) Your **CMEXpert** in **PIN Probe** mode can be used to measure the moisture content of the wood floor to ensure it meets specification.

Testing wood and wood products

a) When testing wood, power-on, insert pin probe at top of **CMEXpert**.
b) When the pin probe is inserted the moisture content (MC) in percent is shown on the right-hand side of the bottom line of the display.
c) If possible, always take readings with the pins parallel to the direction of the wood grain.
d) Calibration tests are based on Douglas fir, which has a published specific gravity (SG) of 0.50.
e) Acceptable levels of moisture content depend on climatic conditions and we advise you check the levels acceptable in your area. Table 1 on page 18 shows the approximate relationship between the ambient relative humidity and equilibrium moisture content in woods.
f) The following moisture content levels are often quoted in the wood industry and should be used as a guide only. Please contact industry associations and manufacturers for their specifications.
    - Furniture: 5% to 6% when used in locations of low relative humidity and up to 10% to 11% may be acceptable where the relative humidity is higher.
    - Interior wood: 6% in low humidity areas. Up to 12% in higher humidity locations.
    - Exterior wood: 10% to 15% depending on local humidity levels.
    - Generally, wood with moisture content in excess of 23% - 25% is susceptible to rot.
    - Wood moisture content in excess of 18% to 20%

may provide an environment for termite and wood-boring insects to thrive and multiply. Wood at these high levels can also support mold and biological growth.

- Wood at 28% moisture content is considered to have reached fiber saturation point.

g) Avoid taking readings on wood from the top of a stack stored outside as these may be affected by surface moisture from recent rain.

h) When taking readings in chemically treated wood, it is advisable to allow for possible effects that the treatment may have on readings.

Temperature Adjustment Chart

The Wood Pin Probe has been calibrated on wood at an ambient temperature of 20ºC (68ºF). When measuring moisture in wood at a different temperature, the following temperature adjustment needs to be applied. (Figures rounded to the nearest whole number).

TEMPERATURE ADJUSTMENT CHART

Wood temperature		Meter reading						
ºC	**ºF**	**7%**	**10%**	**12%**	**15%**	**20%**	**26%**	**30%**
		Adjustment						
5	40	+1	+2	+2	+3	+4	+5	+7
10	50	+0	+1	+1	+2	+2	+3	+4
20	68	+0	+0	+0	+0	+0	+0	+0
30	80	+0	-1	-1	-1	-1	-2	-2
40	100	-1	-2	-2	-3	-3	-3	-4
50	122	-1	-3	-3	-4	-5	-7	-8
60	140	-2	-3	-4	-5	-6	-8	-10
70	158	-3	-4	-5	-6	-8	-10	-12

Example 1:

If meter reads 15% and temperature of wood is 10ºC (50ºF), actual moisture content is 17%. i.e.15%+2%=17%

Example 2:

If meter reads 15% and temperature of wood is 50ºC(122ºF), the actual moisture content is 11%. i.e.15%-4%=11%

Combined Species/Temperature Correction

Example 1

If meter gives reading 15% on a sample of Sitka Spruce and the wood temperature is 40ºC, the correction is as follows:
Species correction @15% = 16%
Temperature correction @ 40ºC = - 3%
Corrected reading: 13%

Example 2

If meter gives reading 24% on sample of Teak and the wood temperature is 10ºC, the correction is as follows:
Species correction @24% = 20%
Temperature correction @ 10ºC = + 2%
Corrected reading: 22%

Humidity & Moisture Content Relationship

The table below shows the approximate relationship between relative humidity **(RH)** and equilibrium moisture content **(EMC)** of some woods.
(These figures are approximate values and may vary for different species.

Relative Humidity	Wood MC%
10%	3 to 5
20%	5 to 6
30%	6 to 8
40%	8 to 10
50%	10 to 11
60%	11 to 13
70%	13 to 15
80%	15 to 18
90%	18 to 23
100%	23 +

Table 1. Approx. relationship between RH and EMC

SPECIES CORRECTION CHART

Meter reading (% moisture content)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Species	*Correct moisture content*																		
Alder, brown	8	9	10	10	11	12	13	13	14	15	15	16	17	18	18	19	20	20	21
Amberoi	6	7	7	8	9	9	10	11	12	12	13	14	14	15	16	17	17	18	19
Ash, alpine	8	9	10	11	12	13	14	15	16	17	18	18	19	20	21	22	23	24	25
Ash, American	8	9	10	11	11	12	13	14	14	15	16	17	18	19	20	21	23	24	25
Ash, Crow's	8	9	10	10	11	12	12	12	14	14	15	16	17	17	18	19	20	20	21
Ash, European	8	8	9	10	11	12	12	13	14	14	15	16	17	18	18	19	20	21	21
Ash, mountain	8	9	10	11	12	13	14	15	16	17	18	18	19	20	21	22	23	24	25
Ash, silvertop	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Balsa	-	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Baltic, red	-	9	10	11	12	13	14	15	15	16	17	18	18	19	20	21	22	23	24
Baltic, white	-	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27
Bauvudi	7	7	8	9	9	10	11	11	12	13	13	14	15	15	16	17	17	18	18
Bean, black	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23	24	25
Beech, American	6	7	8	10	11	12	13	14	15	16	13	18	19	20	21	23	23	24	25
Beech, Japan	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Beech, myrtle	7	8	9	10	11	11	12	13	14	14	15	16	17	18	18	19	20	21	22

Meter reading (% moisture content)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Species	*Correct moisture content*																		
Beech, silver	9	9	10	10	11	12	12	13	13	14	14	15	16	16	17	17	18	19	19
Beech, Wau	8	9	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Beech, white	7	8	9	10	11	12	13	14	14	15	16	17	18	19	19	20	21	22	23
Birch, European	6	7	8	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Birch, white	8	9	10	11	12	12	13	14	15	15	16	17	18	18	19	20	21	22	22
Blackbutt	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Blackbutt, WA	8	9	10	11	12	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Blackwood	8	9	9	10	11	12	12	13	14	15	16	16	17	18	19	20	20	21	22
Bloodwood, red	9	10	10	11	12	13	14	15	15	16	17	18	19	19	20	21	22	23	23
Bollywood	7	7	8	9	10	11	12	12	13	14	15	16	16	17	18	19	20	21	22
Box, brush	6	7	7	8	8	9	9	10	10	11	11	12	13	13	14	14	15	15	16
Box, grey	9	10	11	12	12	13	14	14	15	16	17	17	18	19	20	20	21	22	23
Box, grey, coast	8	9	10	11	11	12	13	14	14	15	16	17	18	18	19	20	21	22	22
Box, kanuka	8	8	9	10	11	12	12	13	14	15	16	16	17	18	19	20	20	21	22
Brownbarrel	6	7	8	9	10	11	12	12	13	14	15	16	17	18	18	19	20	21	22

Meter reading (% moisture content)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Species	*Correct moisture content*																		
Buchanania	5	6	7	8	9	10	10	11	12	13	14	14	15	16	17	18	19	19	20
Candlenut	-	5	8	10	12	14	16	18	21	23	25	27	29	31	34	36	38	40	42
Carabeen, yellow	7	8	9	9	10	11	12	12	13	14	14	15	16	16	17	18	18	19	20
Cedar, red	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	25	26	27	27
Cedar, red, western	6	7	9	10	11	12	13	13	14	15	17	18	19	20	21	22	23	24	25
Cedar, South American	-	9	10	11	12	13	13	14	15	16	17	17	18	19	20	21	22	22	23
Cherry	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26
Coachwood	5	6	7	8	9	10	11	12	13	14	14	15	16	17	18	19	20	21	22
Dakua salusalu	8	9	10	11	11	12	13	14	15	16	17	18	19	19	20	21	22	23	24
Douglas Fir	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Elm	5	6	7	7	8	9	10	12	13	13	14	15	15	16	17	18	19	20	20
Erima	7	8	8	9	10	11	12	12	13	14	15	15	16	17	18	19	19	20	21
Fir, Alpine	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Fir, amabilis	-	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Fir, red	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	25	26

Meter reading (% moisture content)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Species	*Correct moisture content*																		
Fir, white	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	25	26
Gum, blue, southern	-	9	10	11	12	13	14	15	15	16	17	18	18	19	20	21	22	23	24
Gum, blue Tasmanian	7	8	9	10	11	12	12	13	14	15	16	17	17	18	19	20	21	22	22
Gum, grey	7	8	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Gum, grey, mountain	8	9	9	10	11	12	13	14	14	15	16	17	18	19	19	20	21	22	23
Gum, lemon-scented	6	6	7	8	9	10	10	11	12	13	13	14	15	16	17	17	18	19	20
Gum, Maiden's	9	10	11	11	12	13	14	15	16	16	17	18	19	20	20	21	22	23	24
Gum, manna	6	7	7	8	9	10	11	12	13	14	14	15	16	17	18	19	20	21	21
Gum, mountain	6	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Gum, American, red	9	10	11	12	12	13	14	15	16	17	18	18	19	20	21	22	23	24	24
Gum, red, river	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Gum, rose	8	9	10	11	12	13	14	14	15	16	17	18	18	19	20	21	22	23	24
Gum, shining	7	8	9	10	11	11	12	13	14	15	16	17	18	19	20	20	21	22	23
Gum, yellow	9	9	10	11	12	12	13	14	15	15	16	17	18	18	19	20	21	21	22

Meter reading (% moisture content)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Species	*Correct moisture content*																		
Hemlock, western	7	8	9	10	11	12	13	15	16	17	18	19	20	21	22	23	24	26	27
Hickory	-	-	7	9	11	13	14	16	17	18	20	21	22	24	-	-	-	-	-
Iroko	-	7	7	8	9	10	11	12	13	14	15	15	16	17	18	19	19	20	21
Ironbark, red	10	11	12	12	13	14	15	16	16	17	18	19	20	21	22	22	23	24	24
Ironbark, red, broad-leaved	10	11	12	12	13	14	15	16	16	17	18	19	20	21	22	22	23	24	25
Ironbark, red, narrow-leaved	7	8	9	10	11	12	13	14	14	15	16	17	18	19	20	21	22	23	24
Jarrah	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Jelutong	8	8	9	10	11	12	12	13	14	15	16	16	17	18	19	20	21	21	22
Kamarere (PGN source)	7	8	9	10	10	11	12	13	14	15	16	17	18	19	19	20	21	22	23
Kamarere (Fiji source)	6	7	8	8	9	10	11	11	12	13	13	14	15	15	16	17	17	18	19
Kapur	-	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Karri	7	7	8	9	10	11	12	13	13	14	15	16	17	18	18	19	20	21	22
Kauri, Qld	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23	24	24	25
Kauri, NZ	8	9	10	10	11	12	12	13	13	14	14	15	16	16	17	17	18	18	19
Kauri, Vanikoro	10	11	12	13	13	14	14	15	15	15	16	16	17	17	18	18	18	19	19

Meter reading (% moisture content)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Species	*Correct moisture content*																		
Kempas	9	10	11	11	12	13	14	14	15	16	16	17	18	19	19	20	21	21	22
Laran	7	8	8	9	10	11	11	12	13	14	14	15	16	17	17	18	18	19	19
Larch, European	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Lodgepole Pine	6	7	8	9	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Lumbayau	8	8	9	10	11	12	12	13	14	15	15	16	17	18	19	19	20	21	22
Mahogany, African	-	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Mahogany, American	-	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mahogany, Brazilian	-	-	-	-	10	10	11	12	13	14	15	15	16	17	18	19	20	21	22
Mahogany, brush	8	8	9	10	10	11	11	12	12	13	14	14	15	15	16	16	17	18	18
Mahogany, miva	9	10	11	12	12	13	14	15	15	16	17	18	18	19	20	20	21	22	23
Mahogany, red	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	24	25	26
Mahogany, rose	8	9	10	10	11	12	12	13	14	14	15	16	16	17	18	18	19	20	20
Mahogany, southern	7	8	9	10	11	12	12	13	14	15	16	17	18	19	20	20	21	22	23
Mahogany, Honduras	6	7	7	8	9	10	11	12	13	14	15	16	17	18	19	19	20	21	22
Mahogany, white	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Makoré	-	9	10	11	12	13	14	15	15	16	17	18	18	19	20	21	22	23	24
Malas	6	7	8	9	9	10	11	12	12	13	14	15	15	16	17	18	19	19	20

Meter reading (% moisture content)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Species	*Correct moisture content*																		
Maple, Canadian	6	7	8	9	10	11	12	13	14	15	16	17	18	18	20	21	22	23	24
Maple, Qld	9	10	10	11	12	13	14	15	16	17	18	18	19	20	21	22	23	24	24
Maple, rose	7	8	8	9	10	10	11	12	12	13	14	14	15	16	16	17	18	18	19
Maple, sugar	6	7	7	8	10	12	13	14	15	16	17	18	19	20	21	22	23	24	-
Mararie	9	10	11	11	12	13	14	14	15	16	17	18	18	19	20	21	21	22	23
Marri	7	7	8	9	9	10	11	11	12	13	13	14	15	15	16	17	17	18	19
Matai	8	9	9	10	11	12	12	13	14	15	16	16	17	18	18	19	20	21	22
Meranti	6	7	8	9	10	11	12	13	14	13	16	17	18	19	20	21	22	23	24
Messmate	9	10	11	12	12	13	14	15	16	16	17	18	18	19	20	21	22	22	23
Nutmeg (Fiji source)	7	7	8	9	10	11	11	12	13	14	14	15	16	17	18	18	19	20	21
Oak, American red	-	7	8	9	11	12	13	14	15	16	17	18	18	20	21	22	23	21	25
Oak, European	7	7	8	9	10	11	12	13	14	15	16	17	18	19	21	22	23	24	25
Oak, New Guinea	7	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Oak, silky, northern	7	8	8	9	10	11	12	13	14	15	16	17	17	18	19	20	21	22	23
Oak, silky, red	7	8	9	9	10	11	11	12	13	13	14	15	16	16	17	18	18	19	20
Oak, silky, southern	7	7	10	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Oak, tulip, blush	8	7	11	12	12	13	14	15	16	16	17	18	19	20	21	22	23	24	25

Meter reading (% moisture content)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Species	*Correct moisture content*																		
Oak, tulip, brown	10	10	11	12	12	13	13	14	14	15	16	16	17	18	18	19	19	20	20
Oak, tulip, red	10	11	12	13	14	15	16	17	18	18	19	20	21	22	23	24	25	25	26
Oak, white	5	6	7	8	9	10	11	12	13	14	15	16	17	18	18	19	20	21	22
Obeche	-	7	8	9	10	10	1	12	13	14	15	15	16	16	17	18	18	19	20
Padauk, African	-	7	7	8	9	10	11	12	13	14	15	15	16	17	18	19	19	20	21
Peppermint, broad-leaved	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Peppermint, narrow-leaved	9	10	11	11	12	13	14	14	15	16	17	18	18	19	20	21	22	22	23
Persimmon	-	7	8	9	10	10	11	12	13	14	15	15	16	16	17	18	18	19	20
Pine, black	6	7	8	9	10	11	12	1	1	14	15	16	16	17	18	19	19	20	21
Pine, bunya	9	10	11	12	12	13	14	14	15	16	16	17	18	18	19	20	21	21	22
Pine, Corsican	-	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27
Pine, cypress, white	8	9	10	11	11	12	13	14	15	17	17	18	19	20	21	22	22	23	24
Pine, hoop	9	10	11	11	12	13	14	15	16	17	17	18	19	20	21	22	22	23	24
Pine, Huon	9	10	10	12	12	13	13	14	15	15	16	17	18	18	19	20	20	21	22
Pine, King William	9	9	9	11	12	12	13	14	14	15	16	16	17	18	18	19	20	20	21

Meter reading (% moisture content)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Species	*Correct moisture content*																		
Pine, klinki	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Pine, longleaf	-	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27
Pine, lodgerpole	6	7	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Pine, maritime	9	10	11	12	12	13	14	15	15	16	17	18	18	19	20	21	21	22	23
Pine, white, NZ	-	-	-	-	11	12	12	13	14	15	16	16	17	18	19	19	20	21	22
Pine, Parana	6	7	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23
Pine, ponderosa	-	7	9	10	11	13	14	15	16	17	18	19	20	21	22	22	23	24	25
Pine, radiata	9	10	11	11	12	13	14	15	16	17	18	19	20	21	22	24	25	26	27
Pine, scots/shortleaf	6	7	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Pine, slash	7	8	9	10	11	12	13	14	15	16	17	17	18	19	20	21	22	23	24
Pine, sugar	7	8	9	10	11	12	13	14	15	16	17	18	20	21	22	23	24	25	26
Pine, white, western	-	-	8	9	10	11	11	12	13	14	15	16	17	17	18	19	20	21	22
Poplar	6	7	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Quandong, silver	7	7	8	9	10	10	11	12	12	13	14	14	15	16	16	17	18	18	19
Raintree	6	6	9	7	8	8	9	9	10	10	11	11	12	-	-	-	-	-	-
Redwood	8	9	9	10	11	12	13	14	15	16	16	17	18	19	20	20	21	22	23

Meter reading (% moisture content)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Species	*Correct moisture content*																		
Redwood, European	6	7	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Rosarosa	8	8	9	10	10	11	12	13	13	14	15	15	16	17	18	18	19	-	-
Sapele	-	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27
Sassafras	8	8	9	10	10	11	12	13	13	14	15	16	16	17	18	18	19	20	21
Sassafras, southern	9	9	10	11	11	12	13	13	14	15	15	16	17	17	18	19	19	20	21
Satinash, grey	7	8	9	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23
Satinash, New Guinea	6	7	8	8	9	10	11	11	12	13	13	14	15	16	16	17	18	19	19
Satinash, rose	6	7	7	8	8	9	10	10	11	12	12	13	13	14	15	16	16	-	-
Satinay	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Satinheart, green	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	-	-
Sepetir	7	8	9	10	12	13	14	15	16	17	18	20	21	22	23	24	25	26	27
Sheoak, river	8	8	9	10	10	11	11	12	12	13	14	14	15	16	16	17	17	18	-
Sheoak, rose	9	9	10	11	11	12	13	13	14	14	15	15	16	16	17	18	18	19	19
Sheoak, WA	9	9	10	11	11	12	12	13	14	14	15	16	16	17	18	18	19	20	20
Silkwood, bolly	9	9	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18

Meter reading (% moisture content)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Species	*Correct moisture content*																		
Silkwood, red	5	6	7	7	8	9	10	10	11	12	12	13	14	14	15	16	17	17	18
Silkwood, silver	9	9	10	11	12	12	13	14	15	15	16	17	18	18	19	20	20	21	22
Spruce, Sitka	-	7	8	9	11	11	12	13	15	16	17	18	19	20	21	22	23	25	26
Spruce, western white	6	7	8	10	11	12	13	14	15	16	17	18	19	20	21	21	23	24	25
Stringybark, brown	8	9	10	11	11	12	13	14	15	16	17	18	19	19	20	21	22	23	24
Stringybark, Darwin	7	8	8	9	10	11	12	13	14	15	15	16	17	18	19	20	21	22	22
Stringybark, yellow	10	11	12	13	14	14	15	16	17	18	18	19	20	21	21	22	23	24	24
Sycamore	-	7	7	8	9	10	11	12	13	14	15	15	16	17	18	19	19	20	21
Sycamore, satin	8	9	9	10	11	11	12	12	13	14	14	15	16	16	17	18	18	19	20
Sycamore, silver	9	9	10	10	11	12	12	13	13	14	14	15	16	16	17	17	18	19	19
Tallowwood	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Tawa	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18
Teak	-	7	7	8	9	10	11	12	13	14	14	15	15	16	16	17	18	19	20
Tingle, red	7	9	10	11	12	13	15	16	17	18	19	21	22	23	24	25	27	28	29
Tingle, yellow	7	9	10	11	12	13	14	15	17	18	19	20	21	22	23	25	26	27	28

Meter reading (% moisture content)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Species	*Correct moisture content*																		
Totara	8	8	9	10	10	11	12	12	13	14	14	15	16	16	17	18	18	19	19
Touriga, red	10	11	11	12	13	14	14	15	16	17	17	18	19	20	20	21	22	23	23
Tuart	9	9	10	11	12	12	13	14	15	15	16	17	17	18	19	20	20	21	22
Turpentine	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	24
Vitex, New Guinea	7	8	8	9	10	11	12	13	13	14	15	16	17	18	18	19	20	21	22
Walnut, African	-	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Walnut, blush	9	10	11	11	12	12	13	14	14	15	16	16	17	18	18	19	19	20	21
Walnut, European	-	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27
Walnut, New Guinea	6	7	8	9	10	11	12	13	14	15	16	17	17	18	19	20	-	-	-
Walnut, Qld	7	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	25	27
Walnut, yellow	6	7	8	8	9	10	10	11	12	12	13	14	14	15	16	17	17	18	19
Wandoo	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23	24	25	25
Wattle, hicory	8	8	9	10	11	11	12	13	13	14	14	15	16	16	17	18	18	19	20
Wattle, silver	8	9	10	10	11	12	13	13	14	15	16	16	17	18	19	20	20	21	22
Western Hemlock	6	7	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Western red spruce	6	7	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Wollybutt	9	10	10	11	12	13	14	15	15	16	17	18	19	20	20	21	22	23	24

Calibration

For regular on-site assessment of your **CMEXpert in moisture measurement mode**, a calibration check-plate is available from the suppliers of your **CMEXpert**. Should it be found that readings are outside the set tolerances, it is recommended that the **CMEXpert** be returned for re-calibration. Calibration adjustments should not be carried out by anyone other than Tramex or their authorised service provider who will issue a calibration certificate on completion.
Requirements for quality management and validation procedures, such as ISO 9000:2000, have increased the need for regulation and verification of measuring and test instruments. It is therefore recommended that calibration of the **CMEXpert** should be checked and certified in accordance with the standards and/or protocols laid down by your industry (usually on an annual basis) by an authorized test provider. The name of your nearest test provider and estimate of cost is available on request.

Limitations

The **CMEXpert** will not detect or measure moisture through any electrically conductive materials including metal sheeting or cladding, black EPDM rubber or wet surfaces.

The ***CMEXpert*** is not suited for taking **comparative readings** in the concrete substrate through thick floor coverings such as wood.

Warranty
Tramex warrants that this instrument will be free from defects and faulty workmanship for a period of one year from date of first purchase.
If a fault develops during the warranty period, Tramex will, at its absolute discretion, either repair the defective product without charge for the parts and labour, or will provide a replacement in exchange for the defective product returned to Tramex Ltd.
This warranty shall not apply to any defect, failure or damage

caused by improper use or improper or inadequate maintenance and care.
In no event shall Tramex, its agents or distributors be liable to the customer or any other person, company or organisation for any special, indirect, or consequential loss or damage of any type whatsoever (including, without limitation, loss of business, revenue, profits, data, savings or goodwill), whether occasioned by the act, breach, omission, default, or negligence of Tramex Ltd., whether or not foreseeable, arising howsoever out of or in connection with the sale of this product including arising out of breach of contract, tort, misrepresentation or arising from statute or indemnity.
Without prejudice to the above, all other warranties, representations and conditions whether made orally or implied by circumstances, custom, contract, equity, statute or common law are hereby excluded, including all terms implied by Section 13, 14 and 15 of the Sale of Goods Act 1893.

Warranty claims
A defective product should be returned shipping pre paid, with full description of defect to your supplier or Tramex at address shown below.

Product development
It is the policy of Tramex to continually improve and update all its products.
We therefore reserve the right to alter the specification or design of this instrument without prior

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